

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Sanger *et al.*,

Serial No.: 09/587,653

Filed: Jun

Group Art Unit: 1648

Examiner: Li, Bao Q.

Atty. Dkt. No.: UTSG:231US

CERTIFICATE OF MAILING
37 C.F.R. 1.8

I certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as First Class Mail in an envelope addressed to: MS MISSING PARTS, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date below:

March 28, 2006

Date

For: 3' SEQUENCE OF THE GB virus B
(GBV-B) GENOME

STATEMENT AS REQUIRED UNDER 37 C.F.R. § 1.825(a) AND (b)
AND STATEMENT AS REQUIRED UNDER 37 C.F.R. § 1.821(g)

MS MISSING PARTS
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Commissioner:

Submitted herewith is a substitute computer readable form and a substitute paper copy of the sequence listing of those sequences in the captioned patent application, wherein minor errors have been corrected. The substitute computer readable form of the sequence listing is the same as the substitute paper copy of the sequence listing. The sequence information provided in the Specification is also the same as the sequence listing of the enclosed substitute computer readable and paper forms of the sequence listing.

In accordance with 37 C.F.R. § 1.821(g), it is herewith represented that no new matter is included with this submission.

Respectfully submitted,



FULBRIGHT & JAWORSKI L.L.P.
600 Congress Avenue, Suite 2400
Austin, Texas 78701
(512) 474-5201

Reg. No. 46,355
Agent for Applicants

Date: March 28, 2006

SEQUENCE LISTING

<110> SANGAR, DAVID V.
LEMON, STANLEY M.

<120> 3' SEQUENCE OF THE GB VIRUS B (GBV-B) GENOME

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<151> 1999-06-04

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| | | | | 55 | | | | | 60 | | | | | 65 | | | | | | |
| cgg | ccc | gag | ggc | agg | acc | tgg | gct | cag | ccc | ggg | tac | cct | tgg | ccc | ctc | 596 | | | | |
| Arg | Pro | Glu | Gly | Arg | Thr | Trp | Ala | Gln | Pro | Gly | Tyr | Pro | Trp | Pro | Leu | | | | | |
| | | | | 70 | | | | | 75 | | | | | 80 | 85 | | | | | |
| tat | ggc | aat | gag | ggt | tgc | ggg | tgg | gcg | gga | tgg | ctc | ctg | tcc | ccc | cgt | 644 | | | | |
| Tyr | Gly | Asn | Glu | Gly | Cys | Gly | Trp | Ala | Gly | Trp | Leu | Leu | Ser | Pro | Arg | | | | | |
| | | | | 90 | | | | | 95 | | | | | 100 | | | | | | |
| ggc | tct | cgg | cct | agc | tgg | ggc | ccc | aca | gac | ccc | cgg | cgt | agg | tgg | cgc | 692 | | | | |
| Gly | Ser | Arg | Pro | Ser | Trp | Gly | Pro | Thr | Asp | Pro | Arg | Arg | Arg | Ser | Arg | | | | | |
| | | | | 105 | | | | | 110 | | | | | 115 | | | | | | |
| aat | ctg | ggt | aag | gtc | atc | gat | acc | ctt | acg | tgc | ggc | ttc | gcc | gac | ctc | 740 | | | | |
| Asn | Leu | Lys | Val | Ile | Asp | Thr | Leu | Thr | Cys | Gly | Phe | Ala | Asp | Leu | | | | | | |
| | | | | 120 | | | | | 125 | | | | | 130 | | | | | | |
| atg | ggg | tac | ata | ccg | ctc | gtc | ggc | goc | cct | ctt | gga | ggc | gct | gcc | agg | 788 | | | | |
| Met | Gly | Tyr | Ile | Pro | Leu | Val | Gly | Ala | Pro | Leu | Gly | Gly | Ala | Ala | Arg | | | | | |
| | | | | 135 | | | | | 140 | | | | | 145 | | | | | | |
| gdc | ctg | gcg | cat | ggc | gtc | cgg | gtc | ctg | gaa | gac | ggc | gtg | aan | tar | gca | 836 | | | | |
| Ala | Leu | Ala | His | Gly | Val | Arg | Val | Leu | Glu | Asp | Gly | Val | Asn | Tyr | Ala | | | | | |
| | | | | 150 | | | | | 155 | | | | | 160 | 165 | | | | | |
| aca | ggg | aac | ctt | cct | ggt | tgc | tct | ttc | tct | atc | ttc | ctt | ctg | gcc | ctg | 884 | | | | |
| Thr | Gly | Asn | Leu | Pro | Gly | Cys | Ser | Phe | Ser | Ile | Phe | Leu | Leu | Ala | Leu | | | | | |
| | | | | 170 | | | | | 175 | | | | | 180 | | | | | | |
| ctc | tct | tcg | ctg | act | gtg | ccc | gct | tca | gcc | tac | caa | gtg | cgc | aat | tcc | 932 | | | | |
| Leu | Ser | Cys | Leu | Thr | Val | Pro | Ala | Ser | Ala | Tyr | Gln | Val | Arg | Asn | Ser | | | | | |
| | | | | 185 | | | | | 190 | | | | | 195 | | | | | | |
| tgg | ggg | ctc | tac | cat | gtc | acc | aat | gat | tgc | cct | aac | tcg | aat | att | gtg | 980 | | | | |
| Ser | Gly | Leu | Tyr | His | Val | Thr | Asn | Asp | Cys | Pro | Asn | Ser | Ser | Ile | Val | | | | | |
| | | | | 200 | | | | | 205 | | | | | 210 | | | | | | |
| tac | gag | gcg | gcc | gat | goc | atc | ctg | cac | act | cgg | ggg | tgt | gtc | cct | tgc | 1028 | | | | |
| Tyr | Glu | Ala | Ala | Asp | Ala | Ile | Leu | His | Thr | Pro | Gly | Cys | Val | Pro | Cys | | | | | |

| 215 | 220 | 225 | |
|---|-----|-----|------|
| gtt cgc gag ggt aac gcc tgc agg tgt tgg gtg qcg ctg acc ccc acg | | | 1076 |
| Val Arg Glu Gly Asn Ala Ser Arg Cys Trp Val Ala Val Thr Pro Thr | | | |
| 230 | 235 | 240 | 245 |
| qtg gcc acc agg gac ggc aaa ctg ccc acc acg cag ctt cga cgt cat | | | 1124 |
| Val Ala Thr Arg Asp Gly Lys Leu Pro Thr Thr Gln Leu Arg Arg His | | | |
| | 250 | 255 | 260 |
| atc gat ctg ctc gtc ggg agc gcc acc ctg tgc tgc gcc ctc tac gtg | | | 1172 |
| Ile Asp Leu Leu Val Gly Ser Ala Thr Leu Cys Ser Ala Leu Tyr Val | | | |
| | 265 | 270 | 275 |
| ggg gac ctg tgc ggg tct gtc ttt ctt qtt ggt caa ctg ttt acc ttc | | | 1220 |
| Gly Asp Leu Cys Gly Ser Val Phe Leu Val Gly Gln Leu Phe Thr Phe | | | |
| | 280 | 285 | 290 |
| tct ccc agg cgc cao tgg acg acg caa gac tgc aat tgt tct acc cat | | | 1268 |
| Ser Pro Arg Arg His Trp Thr Thr Gln Asp Cys Asn Cys Ser Ile Tyr | | | |
| | 295 | 300 | 305 |
| ccc ggc cat ata acg ggt cat cgc atg goa tgg gat atg atg atg aac | | | 1316 |
| Pro Gly His Ile Thr Gly His Arg Met Ala Trp Asp Met Met Met Asn | | | |
| | 310 | 315 | 320 |
| tgg tcc cct acg gca gcg ttg gtg gta gct cag ctg ctc cgg atc cca | | | 1364 |
| Trp Ser Pro Thr Thr Ala Ala Leu Val Val Ala Gln Leu Leu Arg Ile Pro | | | |
| | 330 | 335 | 340 |
| caa gcc atc atg gac atg atc gct qct cct ccc tgg gga gtc ctg ggg | | | 1412 |
| Gln Ala Ile Met Asp Met Ile Ala Gly Ala His Trp Gly Val Leu Ala | | | |
| | 345 | 350 | 355 |
| ggc ata gcg cat ctc tcc atg gtg ggg aac tgg gcg aag gtc ctg gta | | | 1460 |
| Gly Ile Ala Tyr Phe Ser Met Val Gly Asn Trp Ala Lys Val Leu Val | | | |
| | 360 | 365 | 370 |
| gtg ctg ctg cta ttt gcc ggc gtc gac gcg gaa acc cag gtc acc ggg | | | 1508 |
| Val Leu Leu Leu Phe Ala Gly Val Asp Ala Glu Thr His Val Thr Gly | | | |
| | 375 | 380 | 385 |
| gga aat gcc ggc cgc acc acg gct ggg ctt gtt ggt ctc ctt acc cca | | | 1556 |
| Gly Asn Ala Gly Arg Thr Thr Ala Gly Leu Val Gly Leu Leu Thr Pro | | | |
| | 390 | 395 | 400 |
| ggc gcc aag cag aac atc caa ctg atc aac acc aac ggc agt tgg cac | | | 1604 |
| Gly Ala Lys Gln Asn Ile Gln Leu Ile Asn Thr Asn Gly Ser Trp His | | | |
| | 410 | 415 | 420 |
| atc aat agc acg gcc ttg aat tgc aat gaa agc ctt aac acc ggc tgg | | | 1652 |
| Ile Asn Ser Thr Ala Leu Asn Cys Asn Glu Ser Leu Asn Thr Gly Trp | | | |
| | 425 | 430 | 435 |
| tta gca ggg ctc ttc tat caa cac aaa ttc aac tct tca ggc tgt cct | | | 1700 |
| Leu Ala Gly Leu Phe Tyr Gln His Lys Phe Asn Ser Ser Gly Cys Pro | | | |
| | 440 | 445 | 450 |

| | |
|---|------|
| gag agg tgg gcc agc tgc cga cgc ctt acc gat ccc gcc cag ggc tgg Glu Arg Leu Ala Ser Cys Arg Arg Leu Thr Asp Phe Ala Gln Gly Trp 455 460 465 | 1748 |
| qgt ccc atc aat tat gcc aac qga aac qgc ctc qac gaa cgc ccc tac Gly Pro Ile Ser Tyr Ala Asn Gly Ser Gly Leu Asp Glu Arg Pro Tyr 470 475 480 485 | 1796 |
| tgc tgg cac tac cct cca aga cct tgt ggc att gtg ccc gca aag agc Cys Trp His Tyr Pro Pro Arg Pro Cys Gly Ile Val Pro Ala Lys Ser 490 495 500 | 1844 |
| gtg tgt ggc ccg gta tat tgc ttc act ccc agc ccc gtg gtg gtg gga Val Cys Gly Pro Val Tyr Cys Phe Thr Pro Ser Pro Val Val Val Gly 505 510 515 | 1892 |
| acg acc gac agg tgg ggc ggc cct acc tac agc tgg ggt gca aat gat Thr Thr Asp Arg Ser Gly Ala Pro Thr Tyr Ser Trp Gly Ala Asn Asp 520 525 530 | 1940 |
| acg gat gtc ttc gtc ctt aac aac acc agg cca ccg ctg ggc aat tgg Thr Asp Val Phe Val Leu Asn Asn Thr Arg Pro Pro Leu Gly Asn Trp 535 540 545 | 1988 |
| ttc ggt tgt acc tgg atg aac tca act gga ttc acc aaa gtg tgc gga Phe Gly Cys Thr Trp Met Asn Ser Thr Gly Phe Thr Lys Val Cys Gly 550 555 560 565 | 2036 |
| gcg ccc ccc tgt gtc atc gga ggg gtg ggc aac aac acc ttg ctc tgc Ala Pro Pro Cys Val Ile Gly Gly Val Gly Asn Asn Thr Leu Leu Cys 570 575 580 | 2084 |
| ccc act gat tgc ttc cgc aaa cat ccg gaa gcc aca tac tct cgg tgc Pro Thr Asp Cys Phe Arg Lys His Pro Glu Ala Thr Tyr Ser Arg Cys 585 590 595 | 2132 |
| ggc ccc ggt ccc tgg att aca ccc agg tgc atg gtc gac tac ccg tat Gly Ser Gly Pro Trp Ile Thr Pro Arg Cys Met Val Asp Tyr Pro Tyr 600 605 610 | 2180 |
| agg ctt tgg cac tat cct tgt acc atc aat tac acc ata ttc aaa gtc Arg Leu Trp His Tyr Pro Cys Thr Ile Asn Tyr Thr Ile Phe Lys Val 615 620 625 | 2228 |
| agg atg tac gtg gga ggg gtc gag cac agg ctg gaa gcg gcc tgc aac Arg Met Tyr Val Gly Gly Val Glu His Arg Leu Glu Ala Ala Cys Asn 630 635 640 645 | 2276 |
| tgg acc cgg ggc gaa cgc tgt gat ctg gaa gac agg gac agg tcc gag Trp Thr Arg Gly Glu Arg Cys Asp Leu Glu Asp Arg Asp Arg Ser Glu 650 655 660 | 2324 |
| cto agc ccg ttg ctg ctg tcc acc aca cag tgg cag gtc ctt ccg tgt Leu Ser Pro Leu Leu Leu Ser Thr Thr Gln Trp Gln Val Leu Pro Cys 665 670 675 | 2372 |

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tct ttc acg acc ctg cca gcc ttg tcc acc ggc ctc atc cac ctc cac 2420
Ser Phe Thr Thr Leu Pro Ala Leu Ser Thr Gly Leu Ile His Leu His
680 685 690

cag aac att gtg gac gcg cag tac ttg tac ggg gta ggg toa agc atc 2460
Gln Asn Ile Val Asp Val Gln Tyr Leu Tyr Gly Val Gly Ser Ser Ile
695 700 705

ggg tcc tgg gcc att aag tgg gag tcc gtc gtt ctc ctg ttc ctt ctg 2516
Ala Ser Trp Ala Ile Lys Trp Glu Tyr Val Val Leu Leu Phe Leu Leu
710 715 720 725

ctt gca gac gcg cgc gtc tgc tcc tgc ttg tgg atg atg tta ctc ata 2564
Leu Ala Asp Ala Arg Val Cys Ser Cys Leu Trp Met Met Leu Leu Ile
730 735 740

tcc caa gcc gag gcg gct ttg gag aac ctc gta ata ctc aac gca gca 2612
Ser Gln Ala Glu Ala Ala Leu Glu Asn Leu Val Ile Leu Asn Ala Ala
745 750 755

tcc ctg gcc ggg acg cac ggt ctt gtg tcc ttc ctc gtg ttc ttc tgc 2660
Ser Leu Ala Gly Thr His Gly Leu Val Ser Phe Leu Val Phe Phe Cys
760 765 770

ttt acg tgg tat ctg aag ggt agg tgg gtg ccc gga gcg gtc tac gcc 2708
Phe Ala Trp Tyr Leu Lys Gly Arg Trp Val Pro Gly Ala Val Tyr Ala
775 780 785

ctc tac ggg atg tgg cct ctc ctc ctg ctc ctg ctg gcg tta cct cag 2756
Leu Tyr Gly Met Trp Pro Leu Leu Leu Leu Leu Ala Leu Pro Gln
790 795 800 805

cgg gca tac sca ctg gar arg gag gtg gcc gcg tgg tgt ggc ggc gtt 2804
Arg Ala Tyr Ala Leu Asp Thr Glu Val Ala Ala Ser Cys Gly Gly Val
810 815 820

gtt ctt gtc ggg tta atg gcg ctg acc ctg tgg cca tat tac aag cgc 2852
Val Leu Val Gly Leu Met Ala Leu Thr Leu Ser Pro Tyr Tyr Lys Arg
825 830 835

tat atc agc tgg tgc atg tgg tgg ctt cag tat ttt ctg acc aga gta 2900
Tyr Ile Ser Trp Cys Met Trp Trp Leu Gln Tyr Phe Leu Thr Arg Val
840 845 850

gaa gcg caa ctg caa gtg tgg gtt ccc ccc ctc aac gtc cgg ggg ggg 2948
Glu Ala Gln Leu His Val Trp Val Pro Pro Leu Asn Val Arg Gly Gly
855 860 865

cgc gat gcc gtc atc tta ctc atg tgt gta gta caa cgg acc ctg gta 2996
Arg Asp Ala Val Ile Leu Leu Met Cys Val Val His Pro Thr Leu Val
870 875 880 885

ttt gac atc acc aaa cta ctc ctg gcc atc ttc gga ccc ctt tgg att 3044
Phe Asp Ile Thr Lys Leu Leu Leu Ala Ile Phe Gly Pro Leu Trp Ile
890 895 900

ctt caa gcc agt ttg ctt aaa gtc ccc tac ttc gtg cgc gtt caa ggc 3092

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Leu Gln Ala Ser Leu Leu Lys Val Pro Tyr Phe Val Arg Val Gln Gly
    905                                910                                915

ctt ctc cgg acc tgc gcg cta gcg cgg aaq ata gcc gga ggt cat tac    3140
Leu Leu Arg Ile Cys Ala Leu Ala Arg Lys Ile Ala Gly Gly His Tyr
    920                                925                                930

gtg caa atg gcc acc atc aag tta ggg gcg ctt act ggc acc tat gtg    3188
Val Gln Met Ala Ile Ile Lys Leu Gly Ala Leu Thr Gly Thr Tyr Val
    935                                940                                945

tat aac cat ctc acc cct ctt cga gac tgg gcg cac aac ggc ctg cga    3236
Tyr Asn His Leu Thr Pro Leu Arg Asp Trp Ala His Asn Gly Leu Arg
    950                                955                                960

gat ctg gcc gtg gct gtg gaa cca gtc gtc ttc tcc cga atg gag acc    3284
Asp Leu Ala Val Ala Val Glu Pro Val Val Phe Ser Arg Met Glu Thr
    970                                975                                980

aag ctc atc acg tgg ggg gca gat acc gcc gcg tgc ggt gac atc atc    3332
Lys Leu Ile Thr Trp Gly Ala Asp Thr Ala Ala Cys Gly Asp Ile Ile
    985                                990                                995

aac ggc ttg ccc gtc tct gcc cgt agg ggc cag gag ata ctg ctt ggg    3380
Asn Gly Leu Pro Val Ser Ala Arg Arg Gly Gln Glu Ile Leu Leu Gly
    1000                                1005                                1010

cca gcc gar gga arg gtc tcc aag ggg tgg agg ttg ctg gcg ccc atc    3428
Pro Ala Asp Gly Met Val Ser Lys Gly Trp Arg Leu Leu Ala Pro Ile
    1015                                1020                                1025

acg gcg tac gcc cag cag acg aga ggc ctc cta ggg tgt ata atc acc    3476
Thr Ala Tyr Ala Gln Gln Thr Arg Gly Leu Leu Gly Cys Ile Ile Thr
    1030                                1035                                1040

agc ctg act ggc cgg gac aaa aac caa gtg gag ggt gag gtc cag atc    3524
Ser Leu Thr Gly Arg Asp Lys Asn Gln Val Glu Gly Glu Val Gln Ile
    1050                                1055                                1060

gtg tca act gct acc caa acc ttc ctg gca acg tgc atc aar ggg gta    3572
Val Ser Thr Ala Thr Gln Thr Phe Leu Ala Thr Cys Ile Asn Gly Val
    1065                                1070                                1075

tgc tgg act gtc tac cac ggg gcc gga acg agg acc atc gca tca ccc    3620
Cys Trp Thr Val Tyr His Gly Ala Gly Thr Arg Thr Ile Ala Ser Pro
    1080                                1085                                1090

aag ggt cct gtc atc caa atg tat acc aat gtg gac caa gac ctt gtg    3668
Lys Gly Pro Val Ile Gln Met Tyr Thr Asn Val Asp Gln Asp Leu Val
    1095                                1100                                1105

ggc tgg ccc gct cct caa ggt tcc cgc tca ttg aca ccc tct acc tgc    3716
Gly Trp Pro Ala Pro Gln Gly Ser Arg Ser Leu Thr Pro Cys Thr Cys
    1110                                1115                                1120

ggc tcc tcc gac ctt tac ctg gtc acg agg cac gcc gat gtc att ccc    3764
Gly Ser Ser Asp Leu Tyr Leu Val Thr Arg His Ala Asp Val Ile Pro

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| | 1130 | 1135 | 1140 | |
|---|------|------|------|------|
| gtg cgc cgg cga ggt gat agc agg ggt agc ctg ctt tgc ccc cgg ccc | | | | 3812 |
| Val Arg Arg Arg Gly Asp Ser Arg Gly Ser Leu Leu Ser Pro Arg Pro | 1145 | 1150 | 1155 | |
| atc tcc tac ttc aaa ggc tcc tgc ggg ggt ccg ctg ttg tgc ccc gcg | | | | 3860 |
| Ile Ser Tyr Leu Lys Gly Ser Ser Gly Gly Pro Leu Leu Cys Pro Ala | 1160 | 1165 | 1170 | |
| gga ccc gcc gtg ggc cta ttc agg ggc gcg gtg tgc acc cgt gga gtg | | | | 3908 |
| Gly His Ala Val Gly Leu Phe Arg Ala Ala Val Cys Thr Arg Gly Val | 1175 | 1180 | 1185 | |
| gct aaa gcg gtg gac ttt atc cct gtg gag aac cta ggg aca acc atg | | | | 3956 |
| Ala Lys Ala Val Asp Phe Ile Pro Val Glu Asn Leu Gly Thr Thr Met | 1190 | 1195 | 1200 | 1205 |
| aga tcc ccg gtg ttc acg gac aac tcc tct cca cca gca gtg ccc cag | | | | 4004 |
| Arg Ser Pro Val Phe Thr Asp Asn Ser Ser Pro Pro Ala Val Pro Gln | 1210 | 1215 | 1220 | |
| agc ttc cag gtg gcc cac ctg cat gct ccc acc ggc agc ggt aag agc | | | | 4052 |
| Ser Phe Gln Val Ala His Leu His Ala Pro Thr Gly Ser Gly Lys Ser | 1225 | 1230 | 1235 | |
| acc aag ctg ccg gct gcg tac gca gcc cag ggc tac aag gtg ttg gtg | | | | 4100 |
| Thr Lys Val Pro Ala Ala Tyr Ala Ala Gln Gly Tyr Lys Val Leu Val | 1240 | 1245 | 1250 | |
| ctc aac ccc tct gtt gct gca acg ctg ggc tat ggt gct tac atg tcc | | | | 4148 |
| Leu Asn Pro Ser Val Ala Ala Thr Leu Gly Phe Gly Ala Tyr Met Ser | 1255 | 1260 | 1265 | |
| aag gcc cat ggg gtt gat cct aat atc agg acc ggg gtg aga aca att | | | | 4196 |
| Lys Ala His Gly Val Asp Pro Asn Ile Arg Thr Gly Val Arg Thr Ile | 1270 | 1275 | 1280 | 1285 |
| acc act ggc agc ccc atc acg tac tcc acc tac ggc aag ttc ctt gcc | | | | 4244 |
| Thr Thr Gly Ser Pro Ile Thr Tyr Ser Thr Tyr Gly Lys Phe Leu Ala | 1290 | 1295 | 1300 | |
| gac ggc ggg tgc tca gga ggt gct tat gac ata ata att tgt gac gag | | | | 4292 |
| Asp Gly Gly Cys Ser Gly Gly Ala Tyr Asp Ile Ile Ile Cys Asp Glu | 1305 | 1310 | 1315 | |
| tgc cac tcc acg gat gcc aca tcc atc ttg ggc acc ggc act gtc ctt | | | | 4340 |
| Cys His Ser Thr Asp Ala Thr Ser Ile Leu Gly Ile Gly Thr Val Leu | 1320 | 1325 | 1330 | |
| gac caa gca gag act gcg ggg gcg aga ctg gtt gtg ctc gcc act gct | | | | 4388 |
| Asp Gln Ala Glu Thr Ala Gly Ala Arg Leu Val Val Leu Ala Thr Ala | 1335 | 1340 | 1345 | |
| acc cct ccg ggc tcc gtc act gtg tcc cat cct aac atc gag gag gtt | | | | 4436 |
| Thr Pro Pro Gly Ser Val Thr Val Ser His Pro Asn Ile Glu Glu Val | 1350 | 1355 | 1360 | 1365 |

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gct ctg tcc acc acc gga gag atc ccc ttt tac ggc aag got ato ccc 4484
Ala Leu Ser Thr Thr Gly Glu Ile Pro Phe Tyr Gly Lys Ala Ile Pro
1370 1375 1380

ctc gag gtg atc aag ggg gga aga cat ctc atc ttc tgc cac tca aag 4532
Leu Glu Val Ile Lys Gly Gly Arg His Leu Ile Phe Cys His Ser Lys
1385 1390 1395

aag aag tgc gac gag ctc gcc gcg aag ctg gtc gca ttg ggc atc aat 4580
Lys Lys Cys Asp Glu Leu Ala Ala Lys Leu Val Ala Leu Gly Ile Asn
1400 1405 1410

ccc atc ccc tac tac cgc ggt ctt gac gtg tct gtc atc ccc acc agc 4628
Ala Val Ala Tyr Tyr Arg Gly Leu Asp Val Ser Val Ile Pro Thr Ser
1415 1420 1425

ggc gat gtt gtc gtc gtg tgc acc gat gct ctc atg act ggc ccc acc 4676
Gly Asp Val Val Val Val Ser Thr Asp Ala Leu Met Thr Gly Phe Thr
1430 1435 1440 1445

ggc gac ttc gac tct gtg ata gac tgc aac aag tgt gtc act cag aca 4724
Gly Asp Phe Asp Ser Val Ile Asp Cys Asn Thr Cys Val Thr Gln Thr
1450 1455 1460

gtc gat ttc agc ctt gac cct acc ttt acc att gag aca acc acg ctc 4772
Val Asp Phe Ser Leu Asp Pro Thr Phe Thr Ile Glu Thr Thr Thr Leu
1465 1470 1475

ccc cag gat gct gtc tcc agg act can ccc ccc ggc aag acc gcc aag 4820
Pro Gln Asp Ala Val Ser Arg Thr Gln Arg Arg Gly Arg Thr Gly Arg
1480 1485 1490

ggg aag cca ggc atc tat aga ttt gtg gca ccc ggg gag cgc ccc tcc 4868
Gly Lys Pro Gly Ile Tyr Arg Phe Val Ala Pro Gly Glu Arg Pro Ser
1495 1500 1505

ggc atg ttc gac tgc tcc gtc ctc tat gag tgc tat gac gcg ggc tgt 4916
Gly Met Phe Asp Ser Ser Val Leu Cys Glu Cys Tyr Asp Ala Gly Cys
1510 1515 1520 1525

gct tgg tat gag ctc acg ccc gcc gag act aca gtt agg cta cga gcg 4964
Ala Trp Tyr Glu Leu Thr Pro Ala Glu Thr Thr Val Arg Leu Arg Ala
1530 1535 1540

cac atg aac acc ccc ggg ctt ccc gtc tgc cag gac cat ctt gaa ttt 5012
Tyr Met Asn Thr Pro Gly Leu Pro Val Cys Gln Asp His Leu Glu Phe
1545 1550 1555

tgg gag ggc gtc ttt acg ggc ctc act cat ata gat gcc cac ttt tta 5060
Trp Glu Gly Val Phe Thr Gly Leu Thr His Ile Asp Ala His Phe Leu
1560 1565 1570

tcc cag aca aag cag agt ggg gag aac ttt cct tac ctg gta gcg tac 5108
Ser Gln Thr Lys Gln Ser Gly Glu Asn Phe Pro Tyr Leu Val Ala Tyr
1575 1580 1585

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caa gcc acc gtg tgc gct agg gct caa gcc cct ccc cca tgg tgg gac 5156
Gln Ala Thr Val Cys Ala Arg Ala Gln Ala Pro Pro Pro Ser Trp Asp
1590 1595 1600 1605

cag atg tgg aag tgt ttg atc cgc ctt aaa ccc acc ctc cat ggg cca 5204
Gln Met Trp Lys Cys Leu Ile Arg Leu Lys Pro Thr Leu His Gly Pro
1610 1615 1620

aca ccc ctg cta tac aga ctg ggc gct gtt cag aat gaa gtc acc ctg 5252
Thr Pro Leu Leu Tyr Arg Leu Gly Ala Val Gln Asn Glu Val Thr Leu
1625 1630 1635

acg cac cca atc acc aaa tac atc atg aca tgc atg tgg gcc gac ctg 5300
Thr His Pro Ile Thr Lys Tyr Ile Met Thr Cys Met Ser Ala Asp Leu
1640 1645 1650

gag gtc gtc acg agc acc tgg gtg ctc gtt ggc ggc gtc ctg gct gct 5348
Glu Val Val Thr Ser Thr Trp Val Leu Val Gly Gly Val Leu Ala Ala
1655 1660 1665

ctg gcc gcg tat tgc ctg tca aca ggc tgc gtg gtc ata gtg ggc agg 5396
Leu Ala Ala Tyr Cys Leu Ser Thr Gly Cys Val Val Ile Val Gly Arg
1670 1675 1680 1685

atc gcc tgg tcc ggg aag ccg gca att ata ccc gac agg gag gtt ctc 5444
Ile Val Leu Ser Gly Lys Pro Ala Ile Ile Pro Asp Arg Glu Val Leu
1690 1695 1700

tac cag gag ttc gat gag atg gaa gag tgc tct cag cac tta ccg tac 5492
Tyr Gln Glu Phe Asp Glu Met Glu Glu Cys Ser Gln His Leu Pro Tyr
1705 1710 1715

atc gag caa ggg atg atg ctc gct gag cag ttc aag caa aag gcc ctc 5540
Ile Glu Gln Gly Met Met Leu Ala Glu Gln Phe Lys Gln Lys Ala Leu
1720 1725 1730

ggc ctc ctg cag acc gcg tcc cgc cat gca gag gtt atc acc cct gct 5588
Gly Leu Leu Gln Thr Ala Ser Arg His Ala Glu Val Ile Thr Pro Ala
1735 1740 1745

gtc cag acc aac tgg cag aaa ctc gag gtc ttt tgg gcg aag cac atg 5636
Val Gln Thr Asn Trp Gln Lys Leu Glu Val Phe Trp Ala Lys His Met
1750 1755 1760 1765

tgg aat ttc ato agt ggg ata caa tac ttg gcg ggc ctg tca acg ctg 5684
Trp Asn Phe Ile Ser Gly Ile Gln Tyr Leu Ala Gly Leu Ser Thr Leu
1770 1775 1780

cct ggt aac ccc gcc att gct tca ttg atg gct ttt aca gct gcc gtc 5732
Pro Gly Asn Pro Ala Ile Ala Ser Leu Met Ala Phe Thr Ala Ala Val
1785 1790 1795

acc ago cca cta acc act ggc caa acc ctc ctc ttc aac ata ttg ggg 5780
Thr Ser Pro Leu Thr Thr Gly Gln Thr Leu Leu Phe Asn Ile Leu Gly
1800 1805 1810

ggg tgg gtg gct gcc cag ctc gcc gcc ccc ggt gcc gct act gcc ttt 5828

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| | |
|---|------|
| Gly Trp Val Ala Ala Gln Leu Ala Ala Pro Gly Ala Ala Thr Ala Phe | |
| 1815 1820 1825 | |
| gtg ggt gct ggc cta gct ggc gcc gcc atc ggc agc gtt gga ctg ggg | 5976 |
| Val Gly Ala Gly Leu Ala Gly Ala Ala Ile Gly Ser Val Gly Leu Gly | |
| 1830 1835 1840 1845 | |
| aaa gtc ctc gtg gac att ctt gca ggg tat ggc gcg ggc gtg gcg gga | 5974 |
| Lys Val Leu Val Asp Ile Leu Ala Gly Tyr Gly Ala Gly Val Ala Gly | |
| 1850 1855 1860 | |
| gct ctt gta gca ttc aag atc atg agc ggt gag gtc ccc tcc aag gag | 5972 |
| Ala Leu Val Ala Phe Lys Ile Met Ser Gly Glu Val Pro Ser Thr Glu | |
| 1865 1870 1875 | |
| gac ctg gtc aat ctg ctg gcc gcc atc ctc tct cct gga gcc ctt gta | 6020 |
| Asp Leu Val Asn Leu Leu Pro Ala Ile Leu Ser Pro Gly Ala Leu Val | |
| 1880 1885 1890 | |
| gtc ggt gtg gtc tgc gca gca ata ctg cgc cgg cac gtt ggc ccg ggc | 6068 |
| Val Gly Val Val Cys Ala Ala Ile Leu Arg Arg His Val Gly Pro Gly | |
| 1895 1900 1905 | |
| gag ggg gca gtg caa tgg atg aac cgg cta ata gcc ttc gcc tcc cgg | 6116 |
| Glu Gly Ala Val Gln Trp Met Asn Arg Leu Ile Ala Phe Ala Ser Arg | |
| 1910 1915 1920 1925 | |
| ggg aac cat gtt tcc ccc aag cac tac gtg ccg gag aac cat gca gcc | 6164 |
| Gly Asn His Val Ser Pro Thr His Tyr Val Pro Glu Ser Asp Ala Ala | |
| 1930 1935 1940 | |
| gcc cgc gtc act gcc ata ctc agc agc ctc act gta acc cag ctc ctg | 6212 |
| Ala Arg Val Thr Ala Ile Leu Ser Ser Leu Thr Val Thr Gln Leu Leu | |
| 1945 1950 1955 | |
| agg cga ctg cat cag tgg ata agc tct gag tgt ccc act cca tgc ttc | 6260 |
| Arg Arg Leu His Gln Trp Ile Ser Ser Glu Cys Thr Thr Pro Cys Ser | |
| 1960 1965 1970 | |
| ggt tcc tgg cta agg gac atc tgg gac tgg ata tgc gag gtg ctg agc | 6308 |
| Gly Ser Trp Leu Arg Asp Ile Trp Asp Trp Ile Cys Glu Val Leu Ser | |
| 1975 1980 1985 | |
| gac ttt aag acc tgg ctg aaa gcc aag ctc atg cca caa ctg cct ggg | 6356 |
| Asp Phe Lys Thr Trp Leu Lys Ala Lys Leu Met Pro Gln Leu Pro Gly | |
| 1990 1995 2000 2005 | |
| att ccc ttt gtg tcc tgc cag cgc ggg tat agg ggg gtc tgg cga gga | 6404 |
| Ile Pro Phe Val Ser Cys Gln Arg Gly Tyr Arg Gly Val Trp Arg Gly | |
| 2010 2015 2020 | |
| gac ggc att atg cac act cgc tgc cac tgt gga gct gag atc act gga | 6452 |
| Asp Gly Ile Met His Thr Arg Cys His Cys Gly Ala Glu Ile Thr Gly | |
| 2025 2030 2035 | |
| cat gtc aaa aac ggg acg atg agg atc gtc cat cct agg acc tgc agg | 6500 |
| His Val Lys Asn Gly Thr Met Arg Ile Val Gly Pro Arg Thr Cys Arg | |

| 2040 | 2045 | 2050 | |
|---|------|------|------|
| aac atg tgg agt ggg aag ttc ccc att aac gcc tac acc acg ggc ccc | | | 6548 |
| Asn Met Trp Ser Gly Thr Phe Pro Ile Asn Ala Tyr Thr Thr Gly Pro | | | |
| 2055 | 2060 | 2065 | |
| tgt acc ccc ctt cct gcg cgg aac tat aag ttc gcg ctg tgg agg gtg | | | 6596 |
| Cys Thr Pro Leu Pro Ala Pro Asn Tyr Lys Phe Ala Leu Trp Arg Val | | | |
| 2070 | 2075 | 2080 | 2085 |
| tot gca gag gaa tac gtg gag ata agg cgg gtg ggg gac ttc cac tac | | | 6644 |
| Ser Ala Glu Glu Tyr Val Glu Ile Arg Arg Val Gly Asp Phe His Tyr | | | |
| | 2090 | 2095 | 2100 |
| gta tgg ggt atg act act gac aat ctt aaa tgc cgg tgc cag atc cca | | | 6692 |
| Val Ser Gly Met Thr Thr Asp Asn Leu Lys Cys Pro Cys Glu Ile Pro | | | |
| | 2105 | 2110 | 2115 |
| tcg ccc gaa ttt ttc aca gaa tgg gac ggg gtg cgc cta cac agg ttt | | | 6740 |
| Ser Pro Glu Phe Phe Thr Glu Leu Asp Gly Val Arg Leu His Arg Phe | | | |
| | 2120 | 2125 | 2130 |
| ggg ccc cct tgg aag ccc ttg ctg cgg gag gag gta tca ttc aga gta | | | 6788 |
| Ala Pro Pro Cys Lys Pro Leu Leu Arg Glu Glu Val Ser Phe Arg Val | | | |
| | 2135 | 2140 | 2145 |
| gga ctc cnc gag tac ccg gtg ggg tgg caa tta cct tgc gag ccc gaa | | | 6816 |
| Gly Leu His Glu Tyr Pro Val Gly Ser Gln Leu Pro Cys Glu Pro Glu | | | |
| | 2155 | 2160 | 2165 |
| ccg gac gta gcc gtg ttg acg tcc atg ctc act gat ccc tcc cat ata | | | 6884 |
| Pro Asp Val Ala Val Leu Thr Ser Met Leu Thr Asp Pro Ser His Ile | | | |
| | 2170 | 2175 | 2180 |
| aca sca gag gcg gcc ggg aga agg tgg gcg aga ggg tca ccc cct tot | | | 6932 |
| Thr Ala Glu Ala Ala Gly Arg Arg Leu Ala Arg Gly Ser Pro Pro Ser | | | |
| | 2185 | 2190 | 2195 |
| atg gcc agc tcc tgg gct agc cag ctg tcc gct cca tot ctc aag sca | | | 6980 |
| Met Ala Ser Ser Ala Ser Gln Leu Ser Ala Pro Ser Leu Lys Ala | | | |
| | 2200 | 2205 | 2210 |
| act tgc acc gcc aac cat gac tcc cct gac gcc gag ctc ata gag gct | | | 7028 |
| Thr Cys Thr Ala Asn His Asp Ser Pro Asp Ala Glu Leu Ile Glu Ala | | | |
| | 2215 | 2220 | 2225 |
| aac ctc ctg tgg agg cag caa atg ggc aac atc acc agg gtt gag | | | 7076 |
| Asn Leu Leu Trp Arg Gln Glu Met Gly Gly Asn Ile Thr Arg Val Glu | | | |
| | 2235 | 2240 | 2245 |
| tca gag aac aaa gtg gtg att ctg gac tcc ttc gat ccg ctc gtg gca | | | 7124 |
| Ser Glu Asn Lys Val Val Ile Leu Asp Ser Phe Asp Pro Leu Val Ala | | | |
| | 2250 | 2255 | 2260 |
| gag gag gat gag cgg gag gtc gcc gta cct gca gaa att ctg cgg aag | | | 7172 |
| Glu Glu Asp Glu Arg Glu Val Ser Val Pro Ala Glu Ile Leu Arg Lys | | | |
| | 2265 | 2270 | 2275 |

| | |
|---|------|
| tct cgg aga ttc gcc cgg gcc ctg ccc gtc tgg gcg cgg ccg gac tac | 7220 |
| Ser Arg Arg Phe Ala Arg Ala Leu Pro Val Trp Ala Arg Pro Asp Tyr | |
| 2280 2285 2290 | |
| aac ccc ccg cta gta gag acg tgg aaa aag cct gac tac gaa cca cct | 7268 |
| Asn Pro Pro Leu Val Glu Thr Trp Lys Lys Pro Asp Tyr Glu Pro Pro | |
| 2295 2300 2305 | |
| gtg gtc cat ggc tgc ccg cta cca cct cca cgg tcc cct cct gtc cct | 7316 |
| Val Val His Gly Cys Pro Leu Pro Pro Pro Arg Ser Pro Pro Val Pro | |
| 2310 2315 2320 2325 | |
| ccg cct cgg aaa aag cgt acg gtg gtc ccc acc gaa tca acc cta tct | 7364 |
| Pro Pro Arg Lys Lys Arg Thr Val Val Leu Thr Glu Ser Thr Leu Ser | |
| 2330 2335 2340 | |
| act gcc ttg gcc gag ctt gcc acc aaa agt ttt ggc agc tcc tca act | 7412 |
| Thr Ala Leu Ala Glu Leu Ala Thr Lys Ser Phe Gly Ser Ser Ser Thr | |
| 2345 2350 2355 | |
| tcc ggc att acg ggc gac aat acg aca aca tcc tct gag ccc gcc cct | 7460 |
| Ser Gly Ile Thr Gly Asp Asn Thr Thr Ser Ser Glu Pro Ala Pro | |
| 2360 2365 2370 | |
| tct ggc tgc ccc ccc gac tcc gac qtt gag tcc tat tct tcc atg ccc | 7508 |
| Ser Gly Cys Pro Pro Asp Ser Asp Val Glu Ser Tyr Ser Ser Met Pro | |
| 2375 2380 2385 | |
| ccc ctg gag ggg gag cct ggg gat ccg gat cto agc gac ggg tca tgg | 7556 |
| Pro Leu Glu Gly Glu Pro Gly Asp Pro Asp Leu Ser Asp Gly Ser Trp | |
| 2390 2395 2400 2405 | |
| tcg acg gtc agt agt ggg gcc gac acg gaa gat gtc gtg tgc tgc tca | 7604 |
| Ser Thr Val Ser Ser Gly Ala Asp Thr Glu Asp Val Val Cys Cys Ser | |
| 2410 2415 2420 | |
| atg tcc tat tcc tgg aca ggc gca ctc gtc acc ccg tgc gct gcg gaa | 7652 |
| Met Ser Tyr Ser Trp Thr Gly Ala Leu Val Thr Pro Cys Ala Ala Glu | |
| 2425 2430 2435 | |
| gaa caa aaa ctg ccc atc aac gca ctg agc aac tgg ttg cta cgc cat | 7700 |
| Glu Gln Lys Leu Pro Ile Asn Ala Leu Ser Asn Ser Leu Leu Arg His | |
| 2440 2445 2450 | |
| cac aat ctg gtg cat tcc acc act toa dgc agt gct tgc caa agg cag | 7748 |
| His Asn Leu Val Tyr Ser Thr Thr Ser Arg Ser Ala Cys Gln Arg Gln | |
| 2455 2460 2465 | |
| aag aaa ctc aca ttt gac aga ctg caa gtt ctg gac agc cat tac cag | 7796 |
| Lys Lys Val Thr Phe Asp Arg Leu Gln Val Leu Asp Ser His Tyr Gln | |
| 2470 2475 2480 2485 | |
| gac gtg ctc aag gag gtc aaa gca gcg gcg tca aaa gtg aag gct aac | 7844 |
| Asp Val Leu Lys Glu Val Lys Ala Ala Ala Ser Lys Val Lys Ala Asn | |
| 2490 2495 2500 | |

| | |
|---|------|
| ttg cta tcc gra gag gaa got tgc agc ctg aag ccc cca cat tca gcc Leu Leu Ser Val Glu Glu Ala Cys Ser Leu Thr Pro Pro His Ser Ala 2505 2510 2515 | 7892 |
| aaa tcc aag tct ggc tat ggg gca aaa gac gtc cgt tgc cat gcc aga Lys Ser Lys Phe Gly Tyr Gly Ala Lys Asp Val Arg Cys His Ala Arg 2520 2525 2530 | 7940 |
| aag gcc gta gcc cac atc aac tcc gtg tgg aaa gac cct ctg gaa gac Lys Ala Val Ala His Ile Asn Ser Val Trp Lys Asp Leu Leu Glu Asp 2535 2540 2545 | 7988 |
| agt gta cca cca ata gac act acc atc atg gcc aag aac gag gtt ttc Ser Val Thr Pro Ile Asp Thr Thr Ile Met Ala Lys Asn Glu val Phe 2550 2555 2560 2565 | 8036 |
| tgc gtt cag cct gag aag ggg ggt cgt aag cca gct cgt ctc atc gtg Cys Val Gln Pro Glu Lys Gly Gly Arg Lys Pro Ala Arg Leu Ile Val 2570 2575 2580 | 8084 |
| ttc ccc gac ctg ggc gtg cgc gtg tgc gag aag atg gcc ctg tac gac Phe Pro Asp Leu Gly Val Arg Val Cys Glu Lys Met Ala Leu Tyr Asp 2585 2590 2595 | 8132 |
| gtg gtt ago aag ctc ccc ctg gcc gtg atg gga agc tcc tac gga ttc Val Val Ser Lys Leu Pro Leu Ala Val Met Gly Ser Ser Tyr Gly Phe 2600 2605 2610 | 8180 |
| caa tac tca cca gga cag cgg gtt gaa ttc ctc gtc caa gcc tgg aag Gln Tyr Ser Pro Gly Gln Arg Val Glu Phe Leu Val Gln Ala Trp Lys 2615 2620 2625 | 8228 |
| tcc aag aag acc ccg atg ggg ttc tgc tar gat acc cgc tgt ttt gac Ser Lys Lys Thr Pro Met Gly Phe Ser Tyr Asp Thr Arg Cys Phe Asp 2630 2635 2640 2645 | 8276 |
| tcc aca gtc act gag agc gac atc cgt acg gag gag gca att tac caa Ser Thr Val Thr Glu Ser Asp Ile Arg Thr Glu Glu Ala Ile Tyr Gln 2650 2655 2660 | 8324 |
| tgt tgt gac ctg gac ccc caa gcc cgc gtg gcc atc aag tcc ctc act Cys Cys Asp Leu Asp Pro Gln Ala Arg Val Ala Ile Lys Ser Leu Thr 2665 2670 2675 | 8372 |
| gag agg ctt tat gtt ggg ggc cct ctt acc aat tca agg ggg gaa aac Glu Arg Leu Tyr Val Gly Gly Pro Leu Thr Asn Ser Arg Gly Glu Asn 2680 2685 2690 | 8420 |
| tgc gcc tac cgc agg tgc cgc gcc agc ggc gta ctg aca act aac tgt Cys Gly Tyr Arg Arg Cys Arg Ala Ser Gly Val Leu Thr Thr Ser Cys 2695 2700 2705 | 8468 |
| ggc aac acc ctc act tgc tac atc aag gcc cgg gca gcc tgt cga gcc Gly Asn Thr Leu Thr Cys Tyr Ile Lys Ala Arg Ala Ala Cys Arg Ala 2710 2715 2720 2725 | 8516 |
| gca ggg ctc cag gac tgc acc atg ctc gtg tgt ggc gac gac tca gtc | 8564 |

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Ala Gly Leu Gln Asp Cys Thr Met Leu Val Cys Gly Asp Asp Leu Val
      2730                      2735                      2740

gtt atc tgt gaa agt gcg ggg gtc cag gag gac gcg gcg agc ctg aga 8612
Val Ile Cys Glu Ser Ala Gly Val Gln Glu Asp Ala Ala Ser Leu Arg
      2745                      2750                      2755

gcc ttc acg gag got atg acc agg tac tcc gcc ccc ccc ggg gat ccc 8660
Ala Phe Thr Glu Ala Met Thr Arg Tyr Ser Ala Pro Pro Gly Asp Pro
      2760                      2765                      2770

cca caa cca gaa tac gac ttg gag ctt ata aca tca tgc tcc tcc aac 8708
Pro Gln Pro Glu Tyr Asp Leu Glu Leu Ile Thr Ser Cys Ser Ser Asn
      2775                      2780                      2785

gtg tca gtc gcc cac gac ggc gct gga aag agg gtc tac taa ctt acc 8756
Val Ser Val Ala His Asp Gly Ala Gly Lys Arg Val Tyr Tyr Leu Thr
      2790                      2795                      2800                      2805

cgt gac cct aca acc ccc ctg gcg aga gcc gcg tgg gag aca gca aga 8804
Arg Asp Pro Thr Thr Pro Leu Ala Arg Ala Ala Trp Glu Thr Ala Arg
      2810                      2815                      2820

cac act cca gcc aat tcc tgg cta ggc aac ata atc atg ttt gcc ccc 8852
His Thr Pro Val Asn Ser Trp Leu Gly Asn Ile Ile Met Phe Ala Pro
      2825                      2830                      2835

aca ctg tgg gcg agg atg ata ctg atg acc cat ttc ttt agc gtc ctg 8900
Thr Leu Trp Ala Arg Met Ile Leu Met Thr His Phe Phe Ser Val Leu
      2840                      2845                      2850

ata gcc agg gat cag ctt gaa cag gct ctt aac tgt gag atc rac gga 8948
Ile Ala Arg Asp Gln Leu Glu Gln Ala Leu Asn Cys Glu Ile Tyr Gly
      2855                      2860                      2865

gcc tgc tac tcc ata gaa cca ctg gat cta cct cca atc att caa aga 8996
Ala Cys Tyr Ser Ile Glu Pro Leu Asp Leu Pro Pro Ile Ile Gln Arg
      2870                      2875                      2880                      2885

ctc cat ggc ctg agt gca ttr tca ctg cac agt tac tct cca ggt gaa 9044
Leu His Gly Leu Ser Ala Phe Ser Leu His Ser Tyr Ser Pro Gly Glu
      2890                      2895                      2900

atc aat agg gtg gcc gca tgc ctg aga aaa ctt ggg gtc cgg ccc ctg 9092
Ile Asn Arg Val Ala Ala Cys Leu Arg Lys Leu Gly Val Pro Pro Leu
      2905                      2910                      2915

cga gct tgg aga cac cgg gcc cgg agc gtc cgc gct agg ctt ctg tcc 9140
Arg Ala Trp Arg His Arg Ala Arg Ser Val Arg Ala Arg Leu Leu Ser
      2920                      2925                      2930

aga gga ggc agg gct gcc ata tat ggc aag tac ctg ttc aac cgg gca 9188
Arg Gly Gly Arg Ala Ala Ile Cys Gly Lys Tyr Leu Phe Asn Trp Ala
      2935                      2940                      2945

gta aga aca aag ctg aaa ctg act cca ata gcg gcc got ggc cgg ctg 9236
Val Arg Thr Lys Leu Lys Leu Thr Pro Ile Ala Ala Ala Gly Arg Leu

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2950          2955          2960          2965
gac ttg tcc ggt tgg ttc acg gct ggc tac agc ggg gga gac att tat 9284
Asp Leu Ser Gly Trp Phe Thr Ala Gly Tyr Ser Gly Gly Asp Ile Tyr
      2970      2975      2980

cac agc gtg tct cat gcc cgg ccc cgc tgg ttc tgg ttt tgc cta ctg 9332
His Ser Val Ser His Ala Arg Pro Arg Trp Phe Trp Phe Cys Leu Leu
      2985      2990      2995

ctg ctg gct gca ggg gta ggc atc tac ctg ctg ccc aac cga tga 9377
Leu Leu Ala Gly Val Gly Ile Tyr Leu Leu Pro Asn Arg
      3000      3005      3010

aggctggggg aaacactccg gccctttaag ccatttctctg tttttttttt tttttttttt 9437
ttttttttct tttttttttt ctctcttttc ctcttttttt tctttttttt tttctttctt 9497
taatgggtggc tccatcttag ccttagtoac ggctagctgt gaaagggtccg tgaagccgat 9557
gactgcagag agtgcctgata ctggcctctc tgcagatcat gc 9599

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<210> 14
 <211> 3011
 <212> DRT
 <213> Hepatitis C virus

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<400> 14
Met Ser Thr Asn Pro Lys Pro Gln Arg Lys Thr Lys Arg Asn Thr Asn
  1          5          10          15
Arg Arg Pro Gln Asp Val Lys Phe Pro Gly Gly Gly Gln Ile Val Gly
  20          25          30
Gly Val Tyr Leu Leu Pro Arg Arg Gly Pro Arg Leu Gly Val Arg Ala
  35          40          45
Thr Arg Lys Thr Ser Glu Arg Ser Gln Pro Arg Gly Arg Arg Gln Pro
  50          55          60
Ile Pro Lys Ala Arg Arg Pro Glu Gly Arg Thr Trp Ala Gln Pro Gly
  65          70          75          80
Tyr Pro Trp Pro Leu Tyr Gly Asn Glu Gly Cys Gly Trp Ala Gly Trp
  85          90          95
Leu Leu Ser Pro Arg Gly Ser Arg Pro Ser Trp Gly Pro Thr Asp Pro
  100         105         110
Arg Arg Arg Ser Arg Asn Leu Gly Lys Val Ile Asp Thr Leu Thr Cys
  115         120         125
Gly Phe Ala Asp Leu Met Gly Tyr Ile Pro Leu Val Gly Ala Pro Leu
  130         135         140
Gly Gly Ala Ala Arg Ala Leu Ala His Gly Val Arg Val Leu Glu Asp
  145         150         155         160
Gly Val Asn Tyr Ala Thr Gly Asn Leu Pro Gly Cys Ser Phe Ser Ile
  165         170         175
Phe Leu Leu Ala Leu Leu Ser Cys Leu Thr Val Pro Ala Ser Ala Tyr
  180         185         190
Gln Val Arg Asn Ser Ser Gly Leu Tyr His Val Thr Asn Asp Cys Pro
  195         200         205
Asn Ser Ser Ile Val Tyr Glu Ala Ala Asp Ala Ile Leu His Thr Pro
  210         215         220

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Gly Cys Val Pro Cys Val Arg Glu Gly Asn Ala Ser Arg Cys Trp Val
 225 230 235 240
 Ala Val Thr Pro Thr Val Ala Thr Arg Asp Gly Lys Leu Pro Thr Thr
 245 250 255
 Gln Leu Arg Arg His Ile Asp Leu Leu Val Gly Ser Ala Thr Leu Cys
 260 265 270
 Ser Ala Leu Tyr Val Gly Asp Leu Cys Gly Ser Val Phe Leu Val Gly
 275 280 285
 Gln Leu Phe Thr Phe Ser Pro Arg Arg His Trp Thr Thr Gln Asp Cys
 290 295 300
 Asn Cys Ser Ile Tyr Pro Gly His Ile Thr Gly His Arg Met Ala Trp
 305 310 315 320
 Asp Met Met Met Asn Trp Ser Pro Thr Ala Ala Leu Val Val Ala Gln
 325 330 335
 Leu Leu Arg Ile Pro Gln Ala Ile Met Asp Met Ile Ala Gly Ala His
 340 345 350
 Trp Gly Val Leu Ala Gly Ile Ala Tyr Phe Ser Met Val Gly Asn Trp
 355 360 365
 Ala Lys Val Leu Val Val Leu Leu Phe Ala Gly Val Asp Ala Glu
 370 375 380
 Thr His Val Thr Gly Gly Asn Ala Gly Arg Thr Thr Ala Gly Leu Val
 385 390 395 400
 Gly Leu Leu Thr Pro Gly Ala Lys Gln Asn Ile Gln Leu Ile Asn Thr
 405 410 415
 Asn Gly Ser Trp His Ile Asn Ser Thr Ala Leu Asn Cys Asn Glu Ser
 420 425 430
 Leu Asn Thr Gly Trp Leu Ala Gly Leu Phe Tyr Gln His Lys Phe Asn
 435 440 445
 Ser Ser Gly Cys Pro Glu Arg Leu Ala Ser Cys Arg Arg Leu Thr Asp
 450 455 460
 Phe Ala Gln Gly Trp Gly Pro Ile Ser Tyr Ala Asn Gly Ser Gly Leu
 465 470 475 480
 Asp Glu Arg Pro Tyr Cys Trp His Tyr Pro Pro Arg Pro Cys Gly Ile
 485 490 495
 Val Pro Ala Lys Ser Val Cys Gly Pro Val Tyr Cys Phe Thr Pro Ser
 500 505 510
 Pro Val Val Val Gly Thr Thr Asp Arg Ser Gly Ala Pro Thr Tyr Ser
 515 520 525
 Trp Gly Ala Asn Asp Thr Asp Val Phe Val Leu Asn Asn Thr Arg Pro
 530 535 540
 Pro Leu Gly Asn Trp Phe Gly Cys Thr Trp Met Asn Ser Thr Gly Phe
 545 550 555 560
 Thr Lys Val Cys Gly Ala Pro Pro Cys Val Ile Gly Gly Val Gly Asn
 565 570 575
 Asn Thr Leu Leu Cys Pro Thr Asp Cys Phe Arg Lys His Pro Glu Ala
 580 585 590
 Thr Tyr Ser Arg Cys Gly Ser Gly Pro Trp Ile Thr Pro Arg Cys Met
 595 600 605
 Val Asp Tyr Pro Tyr Arg Leu Trp His Tyr Pro Cys Thr Ile Asn Tyr
 610 615 620
 Thr Ile Phe Lys Val Arg Met Tyr Val Gly Gly Val Glu His Arg Leu
 625 630 635 640
 Glu Ala Ala Cys Asn Trp Thr Arg Gly Glu Arg Cys Asp Leu Glu Asp
 645 650 655
 Arg Asp Arg Ser Glu Leu Ser Pro Leu Leu Leu Ser Thr Thr Gln Trp
 660 665 670
 Gln Val Leu Pro Cys Ser Phe Thr Thr Leu Pro Ala Leu Ser Thr Gly

675 680 685
Leu Ile His Leu His Gln Asn Ile Val Asp Val Gln Tyr Leu Tyr Gly
690 695 700
Val Gly Ser Ser Ile Ala Ser Trp Ala Ile Lys Trp Glu Tyr Val Val
705 710 715 720
Leu Leu Phe Leu Leu Leu Ala Asp Ala Arg Val Cys Ser Cys Leu Trp
725 730 735
Met Met Leu Leu Ile Ser Gln Ala Glu Ala Ala Leu Glu Asn Leu Val
740 745 750
Ile Leu Asn Ala Ala Ser Leu Ala Gly Thr His Gly Leu Val Ser Phe
755 760 765
Leu Val Phe Phe Cys Phe Ala Trp Tyr Leu Lys Gly Arg Trp Val Pro
770 775 780
Gly Ala Val Tyr Ala Leu Tyr Gly Met Trp Pro Leu Leu Leu Leu Leu
785 790 795 800
Leu Ala Leu Pro Gln Arg Ala Tyr Ala Leu Asp Thr Glu Val Ala Ala
805 810 815
Ser Cys Gly Gly Val Val Leu Val Gly Leu Met Ala Leu Thr Leu Ser
820 825 830
Pro Tyr Tyr Lys Arg Tyr Ile Ser Trp Cys Met Trp Trp Leu Gln Tyr
835 840 845
Phe Leu Thr Arg Val Glu Ala Gln Leu His Val Trp Val Pro Pro Leu
850 855 860
Asn Val Arg Gly Gly Arg Asp Ala Val Ile Leu Leu Met Cys Val Val
865 870 875 880
His Pro Thr Leu Val Phe Asp Ile Thr Lys Leu Leu Ala Ile Phe
885 890 895
Gly Pro Leu Trp Ile Leu Gln Ala Ser Leu Leu Lys Val Pro Tyr Phe
900 905 910
Val Arg Val Gln Gly Leu Leu Arg Ile Cys Ala Leu Ala Arg Lys Ile
915 920 925
Ala Gly Gly His Tyr Val Gln Met Ala Ile Ile Lys Leu Gly Ala Leu
930 935 940
Thr Gly Thr Tyr Val Tyr Asn His Leu Thr Pro Leu Arg Asp Trp Ala
945 950 955 960
His Asn Gly Leu Arg Asp Leu Ala Val Ala Val Glu Pro Val Val Phe
965 970 975
Ser Arg Met Glu Thr Lys Leu Ile Thr Trp Gly Ala Asp Thr Ala Ala
980 985 990
Cys Gly Asp Ile Ile Asn Gly Leu Pro Val Ser Ala Arg Arg Gly Gln
995 1000 1005
Glu Ile Leu Leu Gly Pro Ala Asp Gly Met Val Ser Lys Gly Trp Arg
1010 1015 1020
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1075 1080 1085
Thr Ile Ala Ser Pro Lys Gly Pro Val Ile Gln Met Tyr Thr Asn Val
1090 1095 1100
Asp Gln Asp Leu Val Gly Trp Pro Ala Pro Gln Gly Ser Arg Ser Leu
1105 1110 1115 1120
Thr Pro Cys Thr Cys Gly Ser Ser Asp Leu Tyr Leu Val Thr Arg His
1125 1130 1135

Ala Asp Val Ile Pro Val Arg Arg Arg Gly Asp Ser Arg Gly Ser Leu
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1155 1160 1165
Leu Leu Cys Pro Ala Gly His Ala Val Gly Leu Phe Arg Ala Ala Val
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Cys Thr Arg Gly Val Ala Lys Ala Val Asp Phe Ile Pro Val Glu Asn
1185 1190 1195 1200
Leu Gly Thr Thr Met Arg Ser Pro Val Phe Thr Asp Asn Ser Ser Pro
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Tyr Lys Val Leu Val Leu Asn Pro Ser Val Ala Ala Thr Leu Gly Phe
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1265 1270 1275 1280
Gly Val Arg Thr Ile Thr Thr Gly Ser Pro Ile Thr Tyr Ser Thr Tyr
1285 1290 1295
Gly Lys Phe Leu Ala Asp Gly Gly Cys Ser Gly Gly Ala Tyr Asp Ile
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Ile Gly Thr Val Leu Asp Gln Ala Glu Thr Ala Gly Ala Arg Leu Val
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Val Leu Ala Thr Ala Thr Pro Pro Gly Ser Val Thr Val Ser His Pro
1345 1350 1355 1360
Asn Ile Glu Glu Val Ala Leu Ser Thr Thr Gly Glu Ile Pro Phe Tyr
1365 1370 1375
Gly Lys Ala Ile Pro Leu Glu Val Ile Lys Gly Gly Arg His Leu Ile
1380 1385 1390
Phe Cys His Ser Lys Lys Lys Cys Asp Glu Leu Ala Ala Lys Leu Val
1395 1400 1405
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Met Thr Gly Phe Thr Gly Asp Phe Asp Ser Val Ile Asp Cys Asn Thr
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Cys Val Thr Gln Thr Val Asp Phe Ser Leu Asp Pro Thr Phe Thr Ile
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Gly Arg Thr Gly Arg Gly Lys Pro Gly Ile Tyr Arg Phe Val Ala Pro
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Gly Glu Arg Pro Ser Gly Met Phe Asp Ser Ser Val Leu Cys Glu Cys
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Val Arg Leu Arg Ala Tyr Met Asn Thr Pro Gly Leu Pro Val Cys Gln
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Asp His Leu Glu Phe Trp Glu Gly Val Phe Thr Gly Leu Thr His Ile
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Asp Ala His Phe Leu Ser Gln Thr Lys Gln Ser Gly Glu Asn Phe Pro
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Tyr Leu Val Ala Tyr Gln Ala Thr Val Cys Ala Arg Ala Gln Ala Pro

1585 1590 1595 1600
Pro Pro Ser Trp Asp Gln Met Trp Lys Cys Leu Ile Arg Leu Lys Pro
1605 1610 1615
Thr Leu His Gly Pro Thr Pro Leu Leu Tyr Arg Leu Gly Ala Val Gln
1620 1625 1630
Asn Glu Val Thr Leu Thr His Pro Ile Thr Lys Tyr Ile Met Thr Cys
1635 1640 1645
Met Ser Ala Asp Leu Glu Val Val Thr Ser Thr Trp Val Leu Val Gly
1650 1655 1660
Gly Val Leu Ala Ala Leu Ala Ala Tyr Cys Leu Ser Thr Gly Cys Val
1665 1670 1675 1680
Val Ile Val Gly Arg Ile Val Leu Ser Gly Lys Pro Ala Ile Ile Pro
1685 1690 1695
Asp Arg Glu Val Leu Tyr Gln Glu Phe Asp Glu Met Glu Glu Cys Ser
1700 1705 1710
Gln His Leu Pro Tyr Ile Glu Gln Gly Met Met Leu Ala Glu Gln Phe
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Lys Gln Lys Ala Leu Gly Leu Leu Gln Thr Ala Ser Arg His Ala Glu
1730 1735 1740
Val Ile Thr Pro Ala Val Gln Thr Asn Trp Gln Lys Leu Glu Val Phe
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Trp Ala Lys His Met Trp Asn Phe Ile Ser Gly Ile Gln Tyr Leu Ala
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Gly Leu Ser Thr Leu Pro Gly Asn Pro Ala Ile Ala Ser Leu Met Ala
1780 1785 1790
Phe Thr Ala Ala Val Thr Ser Pro Leu Thr Thr Gly Gln Thr Leu Leu
1795 1800 1805
Phe Asn Ile Leu Gly Gly Trp Val Ala Ala Gln Leu Ala Ala Pro Gly
1810 1815 1820
Ala Ala Thr Ala Phe Val Gly Ala Gly Leu Ala Gly Ala Ala Ile Gly
1825 1830 1835 1840
Ser Val Gly Leu Gly Lys Val Leu Val Asp Ile Leu Ala Gly Tyr Gly
1845 1850 1855
Ala Gly Val Ala Gly Ala Leu Val Ala Phe Lys Ile Met Ser Gly Glu
1860 1865 1870
Val Pro Ser Thr Glu Asp Leu Val Asn Leu Leu Pro Ala Ile Leu Ser
1875 1880 1885
Pro Gly Ala Leu Val Val Gly Val Val Cys Ala Ala Ile Leu Arg Arg
1890 1895 1900
His Val Gly Pro Gly Glu Gly Ala Val Gln Trp Met Asn Arg Leu Ile
1905 1910 1915 1920
Ala Phe Ala Ser Arg Gly Asn His Val Ser Pro Thr His Tyr Val Pro
1925 1930 1935
Glu Ser Asp Ala Ala Arg Val Thr Ala Ile Leu Ser Ser Leu Thr
1940 1945 1950
Val Thr Gln Leu Leu Arg Arg Leu His Gln Trp Ile Ser Ser Glu Cys
1955 1960 1965
Thr Thr Pro Cys Ser Gly Ser Trp Leu Arg Asp Ile Trp Asp Trp Ile
1970 1975 1980
Cys Glu Val Leu Ser Asp Phe Lys Thr Trp Leu Lys Ala Lys Leu Met
1985 1990 1995 2000
Pro Gln Leu Pro Gly Ile Pro Phe Val Ser Cys Gln Arg Gly Tyr Arg
2005 2010 2015
Gly Val Trp Arg Gly Asp Gly Ile Met His Thr Arg Cys His Gly
2020 2025 2030
Ala Glu Ile Thr Gly His Val Lys Asn Gly Thr Met Arg Ile Val Gly
2035 2040 2045

Pro Arg Thr Cys Arg Asn Met Trp Ser Gly Thr Phe Pro Ile Asn Ala
2050 2055 2060
Tyr Thr Thr Gly Pro Cys Thr Pro Leu Pro Ala Pro Asn Tyr Lys Phe
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Gly Ser Pro Pro Ser Met Ala Ser Ser Ala Ser Gln Leu Ser Ala
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Pro Ser Leu Lys Ala Thr Cys Thr Ala Asn His Asp Ser Pro Asp Ala
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Ile Thr Arg Val Glu Ser Glu Asn Lys Val Val Ile Leu Asp Ser Phe
2245 2250 2255
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Glu Ile Leu Arg Lys Ser Arg Arg Phe Ala Arg Ala Leu Pro Val Trp
2275 2280 2285
Ala Arg Pro Asp Tyr Asn Pro Pro Leu Val Glu Thr Trp Lys Lys Pro
2290 2295 2300
Asp Tyr Glu Pro Pro Val Val His Gly Cys Pro Leu Pro Pro Pro Arg
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Ser Pro Pro Val Pro Pro Pro Arg Lys Lys Arg Thr Val Val Leu Thr
2325 2330 2335
Glu Ser Thr Leu Ser Thr Ala Leu Ala Glu Leu Ala Thr Lys Ser Phe
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Gly Ser Ser Ser Thr Ser Gly Ile Thr Gly Asp Asn Thr Thr Ser
2355 2360 2365
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2370 2375 2380
Tyr Ser Ser Met Pro Pro Leu Glu Gly Glu Pro Gly Asp Pro Asp Leu
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Val Val Cys Cys Ser Met Ser Tyr Ser Trp Thr Gly Ala Leu Val Thr
2420 2425 2430
Pro Cys Ala Ala Glu Glu Gln Lys Leu Pro Ile Asn Ala Leu Ser Asn
2435 2440 2445
Ser Leu Leu Arg His His Asn Leu Val Tyr Ser Thr Thr Ser Arg Ser
2450 2455 2460
Ala Cys Gln Arg Gln Lys Lys Val Thr Phe Asp Arg Leu Gln Val Leu
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2485 2490 2495
Lys Val Lys Ala Asn Leu Leu Ser Val Glu Glu Ala Cys Ser Leu Thr

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ARG CYS HIS ALA ARG LYS ALA VAL ALA HIS ILE ASN SER VAL TRP LYS
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ASP LEU LEU GLU ASP SER VAL THR PRO ILE ASP THR THR ILE MET ALA
2545                2550                2555                2560
LYS ASN GLU VAL PHE CYS VAL GLN PRO GLU LYS GLY GLY ARG LYS PRO
2565                2570                2575
ALA ARG LEU ILE VAL PHE PRO ASP LEU GLY VAL ARG VAL CYS GLU LYS
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MET ALA LEU TYR ASP VAL VAL SER LYS LEU PRO LEU ALA VAL MET GLY
2595                2600                2605
SER SER TYR GLY PHE GLN TYR SER PRO GLY GLN ARG VAL GLU PHE LEU
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VAL GLN ALA TRP LYS SER LYS LYS THR PRO MET GLY PHE SER TYR ASP
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THR ARG CYS PHE ASP SER THR VAL THR GLU SER ASP ILE ARG THR GLU
2645                2650                2655
GLU ALA ILE TYR GLN CYS CYS ASP LEU ASP PRO GLN ALA ARG VAL ALA
2660                2665                2670
ILE LYS SER LEU THR GLU ARG LEU TYR VAL GLY GLY PRO LEU THR ASN
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SER ARG GLY GLU ASN CYS GLY TYR ARG ARG CYS ARG ALA SER GLY VAL
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LEU THR THR SER CYS GLY ASN THR LEU THR CYS TYR ILE LYS ALA ARG
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GLY ASP ASP LEU VAL VAL ILE CYS GLU SER ALA GLY VAL GLN GLU ASP
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ALA ALA SER LEU ARG ALA PHE THR GLU ALA MET THR ARG TYR SER ALA
2755                2760                2765
PRO PRO GLY ASP PRO PRO GLN PRO GLU TYR ASP LEU GLU LEU ILE THR
2770                2775                2780
SER CYS SER SER ASN VAL SER VAL ALA HIS ASP GLY ALA GLY LYS ARG
2785                2790                2795                2800
VAL TYR TYR LEU THR ARG ASP PRO THR THR PRO LEU ALA ARG ALA ALA
2805                2810                2815
TRP GLU THR ALA ARG HIS THR PRO VAL ASN SER TRP LEU GLY ASN ILE
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ILE MET PHE ALA PRO THR LEU TRP ALA ARG MET ILE LEU MET THR HIS
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PHE PHE SER VAL LEU ILE ALA ARG ASP GLN LEU GLU GLN ALA LEU ASN
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CYS GLU ILE TYR GLY ALA CYS TYR SER ILE GLU PRO LEU ASP LEU PRO
2865                2870                2875                2880
PRO ILE ILE GLN ARG LEU HIS GLY LEU SER ALA PHE SER LEU HIS SER
2885                2890                2895
TYR SER PRO GLY GLU ILE ASN ARG VAL ALA ALA CYS LEU ARG LYS LEU
2900                2905                2910
GLY VAL PRO PRO LEU ARG ALA TRP ARG HIS ARG ALA ARG SER VAL ARG
2915                2920                2925
ALA ARG LEU LEU SER ARG GLY GLY ARG ALA ALA ILE CYS GLY LYS TYR
2930                2935                2940
LEU PHE ASN TRP ALA VAL ARG THR LYS LEU LYS LEU THR PRO ILE ALA
2945                2950                2955                2960

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Gly Gly Asp Ile Tyr His Ser Val Ser His Ala Arg Pro Arg Trp Phe
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07/11/2006 11:00 FAX 512 536 4598

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